

# Helping Clean Up a Waterway

## VIRGINIA SOL

- Science 6.9
- Social studies CE.3
- Language arts 6.1, 6.6
- Math 6.18, 6.19
- Technology C/T8.1, C/T8.2

## OBJECTIVES

- Predict different types of litter that will be found at a local water site
- Participate in a local cleanup activity
- Record different types of litter and amounts
- Classify different litter collected during the cleanup activity
- Construct graphs showing different litter collected
- Identify the negative impacts aquatic litter can have on humans, wildlife and habitat
- Discuss strategies to reduce litter pollution at the water study site
- Write about the cleanup experience
- Make a public presentation of the results of the cleanup
- Communicate benefits of keeping water clean

## MATERIALS

- Large garbage bags for collected litter
- Gloves
- Bucket for sharp items
- Scissors to cut fishing line
- Digital camera, if available, to record cleanup
- First aid kit
- Copies of Cleanup Checklist for Students and Cleanup Data Card
- Clipboards and pencils

## SAFETY & REGULATIONS

See Cleanup Checklist for Students, and also the guidelines under Planning a Safe Trip in the Introduction section of this packet.

## TIME NEEDED

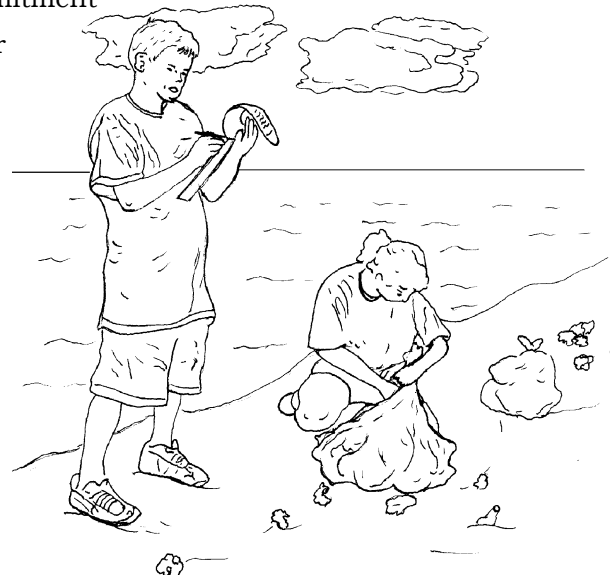
This lesson will involve a field trip to participate in a cleanup. In addition, some class time will be needed before and after the cleanup.

## *What steps can we take to help keep local water clean?*

This lesson is intended for sixth-grade students. The focus is on Virginia Science SOL 6.9. Students will learn more about management of water as a renewable resource and about mitigation of land-use hazards through preventative measures. Different forms of water pollution include litter and debris, sediment, sewage, oil, toxic chemicals, and fertilizer or pesticide runoff. Litter and debris is one pollution form that students can have a direct effect upon. Students can do this by participating in a cleanup campaign and helping to educate others on the negative impacts of litter in our waterways.

Cleaning up aquatic debris gives students a direct and positive role in protecting our aquatic habitats and land-use areas. Participating in cleaning an area can help the students realize that solving water pollution problems requires everyone's involvement. Participating in a cleanup activity can also lead to a student's development of an environmental ethic and heightened commitment to preserve water quality, beauty, and wildlife.

In an earlier lesson in this packet, students classify litter into different categories. In that lesson they could also visit a water site to look for litter around the site.



## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

In the earlier lesson, one of the possible solutions presented for the litter problem is participation in volunteer cleanups. In this lesson students help clean up a local water site.

Ideas for this lesson were taken from the "Plastic Debris Teaching Activities" packet published by Oregon State University, and also from the *Adopt-a-Beach Cleanup* activity from Save Our Seas.

### LESSON INTRODUCTION

Orient the students to the cleanup activity by talking with them about some different water sites they are familiar with. Cleanup sites will often be ocean beaches, but they can also be lakeside beaches or the banks of rivers or streams. Ask the students about the sites they like to visit and what it is they like to do there. Also, ask students what they have seen other people doing there. Different activities might include playing and relaxing, swimming, fishing, canoeing, and use of larger boats. As well as human activities, ask students to think about animals that live in or around the water. Both humans and other animals depend on the water being litter-free and unpolluted.

#### *Predicting litter to be found at the site...*

Before carrying out the cleanup, students should list the behaviors that lead to litter in our waterways, and then predict the different kinds of litter they expect will be found at the site. They can work on this with other students in small groups. Most typically, our beaches and shorelines are littered with different kinds

of plastic debris. People in the immediate area discard some of this litter, some of it comes from boats, and some of it is from "upstream" sources, including urban runoff.

#### **MARINE DEBRIS FROM BOATS**

While in the past it was common practice for boaters to dispose of shipboard garbage by simply throwing it overboard, this is illegal now due to federal laws and international agreements. Fishing vessels may be responsible for plastic netting, rope, and a variety of kitchen garbage such as cottage cheese containers, ice cream cartons, etc. Large freighters may be responsible for such items as strapping bands, plastic pellets, and kitchen garbage.

#### **INLAND SOURCES OF MARINE DEBRIS**

According to the U.S. Environmental Protection Agency, land-based sources cause 80% of the marine debris found on our beaches and in our oceans. In addition to litter on our streets, other land-based sources include landfills, ill-maintained garbage bins and trash that is illegally dumped in or near water bodies. Data collected by The Ocean Conservancy indicate that the debris items most frequently found on our nation's beaches and waterways are related to fast-food consumption (i.e., bottles, cans, cups, plates, food containers, straws, etc.) and smoking activities (i.e., cigarette filters and other litter such as disposable lighters). Some people illegally dump tires, car parts, old refrigerators, construction waste, and other trash into our rivers and bays.

## HELPING CLEAN UP A WATERWAY

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

### ACTIVITY PROCEDURES

#### *Participating in a cleanup...*

Ask about local opportunities for your students to volunteer in a conservation cleanup project. Several groups organize volunteer cleanups in Virginia, and are happy to include school groups. The Ocean Conservancy coordinates the International Coastal Cleanup throughout the world. In Virginia, the International Coastal Cleanup is coordinated each September and October by Clean Virginia Waterways ([www.longwood.edu/cleanva](http://www.longwood.edu/cleanva)). Spring cleanups include the James River Regional Cleanup organized by the James River Advisory Council and the Clean the Bay Day organized by the Chesapeake Bay Foundation. Contact information for these cleanups is provided at the end of this lesson. Details of other cleanup groups, along with contact information, are also provided in the Litter and Debris in Our Waterways chapter earlier in this curriculum packet. You may also choose to carry out your own cleanup at any public beach that is sand or gravel and known to collect litter. State and local parks often have streams and rivers in need of a cleanup. Be sure to ask permission to conduct the cleanup if the area is maintained by any management organization. A park or beach manager may also be able to provide you with cleanup supplies and arrange for collection of trash after the cleanup.

Of course, follow all your normal school procedures for taking students on a field trip out of school. The students will be carrying out a cleanup of the beach area, but you should

also plan time for them to play while they are there. It would be a good idea to have them bring lunches and have a picnic. This will help the students develop an appreciation of being outdoors and make them more likely to want to protect the ocean and water sites from pollution in the future. In advance of the cleanup, brief students on materials to bring and safety precautions. You may use the Cleanup Checklist for Students sheet at the end of this lesson in addition to general information in the Introduction section on Planning a Safe Trip.

Before departure for the cleanup site, divide the students into groups of three or four to work together. Make sure all students know the procedures to be followed, and review safety precautions. At the cleanup site, give each group of students two large garbage bags. Assign each group a stretch of beach or riverbank to clean. The students should have one bag for recyclables (clean aluminum cans and glass bottles, and plastic bottles marked “1” or “2” on the bottom) and another bag for non-recyclable litter items. Sharp items, such as broken glass, should be put into a bucket or box, and not in the trash bags.

#### *Recording types and amounts of litter collected...*

To record the types and amounts of litter collected, students can complete data cards, such as the Cleanup Data Card at the end of this lesson. As the cleanup progresses, each student should take a turn as the data recorder for their team.

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

### *Summarizing cleanup results...*

Students should classify the litter that was collected into categories and then make graphs showing the results of the cleanup. Students should preferably do this by entering the data into spreadsheets and using the computer software to create graphs. Virginia Mathematics SOL 6.18 lists line, bar, and circle graphs; stem-and-leaf plots; and box-and-whisker plots as appropriate graphical methods for displaying data. Students should be encouraged to produce a variety of different kinds of graphs.

### *Writing about the cleanup experience...*

After the cleanup is over, have the students write about what they saw and did at the cleanup site and about their conclusions following analysis of the cleanup results. The Virginia English SOL 6.6 lists specific writing skills to be developed and practiced by sixth-grade students. These should be included in the directions and grading rubric for the students' writing work. Students should also describe how they feel about the problem of litter and aquatic debris after participating in this activity, and they should identify negative impacts of aquatic litter and strategies for reducing litter pollution at the water site.

Have the students discuss in small groups their attitudes about litter and aquatic debris, and whether their attitudes have changed. Have the students list negative impacts of the aquatic litter that was collected in the cleanup. Litter has negative impacts on both human health and safety, and also on wild animals

and their habitat. Also, have the students brainstorm possible strategies to reduce litter pollution at their water site. Emphasize to students that the litter problem is due to human behaviors, and discuss with them how they might be able to have some impact on the problem by changing those behaviors. Educational approaches are an important way of reducing litter. For example, many National and State Parks have adopted a "trash-free" approach, where they require visitors to take their trash home with them after a visit. The parks provide bags, and have signs explaining the policy. Some parks have found that this has decreased litter in the park, while others have seen an increase.

A typical commercial fishing vessel might carry a crew of three and stay at sea for 4 to 5 days during an average fishing trip. They will produce rather a lot of garbage, but the available storage space on the vessel will be very small. Ask students how the trash might be stored until the boat returns to dock. Trash compactors can be used but these cost several hundred dollars to install on a boat. Compacting the trash by hand into garbage bags would save some space. Trash can also be stored on the deck of the boat, but it must be secured so as not to wash away, and it must be out of work areas.

### **ILLEGAL DUMPING**

In the U.S., it is illegal to dump any trash in any lake, stream, river, bay, or within three nautical miles of shore. Even beyond three nautical miles, it is always illegal to dump anything made of plastic.

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

In addition to proper disposal of trash, people must also work to reduce the amount of waste that they produce. This is important, as the growing demand for manufactured and packaged goods has led to an increase in non-biodegradable solid wastes in our waterways. Everyone can reduce their waste significantly by using the three “Rs” described in the earlier chapter in this section, Litter and Debris in Our Waterways. Briefly, the three “Rs” refers to Reduce, Reuse, and Recycle.

### *Presenting cleanup findings and benefits of keeping water clean...*

Students could present a poster display inside their school. They could also include a display of some of the litter and debris that they collected. They could also produce a web page summarizing their work on this project, to be posted on the school web site. Depending on the nature of the cleanup they have participated in, and which organization led this cleanup, the students may have an opportunity to contribute a small part to a summary report of the cleanup produced by the leading organization.

It would be a good idea for students to write letters to organizations that support cleanup activities or to local appointed and elected officials. In their letters, students can describe their observations and conclusions from the cleanup. You may choose to have individual students write letters or for them to write a class letter instead. Another way for students to reach out beyond their school would be for them to create posters about marine debris and hang these in parks’ visitor centers, bait

shops, marinas, and places selling fishing licenses.

Again, the emphasis should be on the importance of managing water as a renewable resource, and on mitigation of land-use hazards through preventative measures. Continue to remind the students that different people use our beaches and water sites for different purposes, and that animals also depend on clean unpolluted habitats.

## QUESTIONS

- What kind of litter was found most often?
- How many recyclable beverage containers did you find?
- Did you find any animals entangled in fishing line or other litter items?
- How did you feel when you picked up someone else's litter?
- What do you think were the behaviors or activities that resulted in the litter you found?
- How do you think litter affects human health and safety?
- How do you think litter affects wild animals and their habitats?
- How did the site compare before and after carrying out the cleanup?
- What could we ask lawmakers to do about the problem of water pollution?
- What can each of us do to minimize the problem of litter pollution?

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

### ASSESSMENTS

- Graphs showing results of the cleanup. This work should be assigned and graded consistent with the skills for sixth-graders listed as Virginia Mathematics SOL 6.18.
- Written summaries of the cleanup experience. This work should be assigned and graded consistent with the writing skills for sixth-graders listed as Virginia English SOL 6.6.
- Students should be asked to make an assessment of their own participation in various small-group activities.

### EXTENSIONS

- Students may wish to carry out a storm drain stenciling project. Since a great deal of litter enters our rivers and bay from urban runoff, storm drain stenciling can help educate people about the connection between our streets and the water quality in near-by water bodies. Virginia's Department of Conservation and Recreation (DCR) offers free storm drain stenciling kits, as does The Ocean Conservancy. DCR also encourages schools to "Adopt-A-Stream," and conduct two or more cleanups every year. For details, see [www.dcr.state.va.us/sw/adopt.htm](http://www.dcr.state.va.us/sw/adopt.htm)
- Students may want to repeat the cleanup activity again. If you decide to conduct regular cleanup collections with the students, they can keep a record of amounts and types of litter that are collected and look for trends.
- A later lesson in this packet, A Scientific Cleanup, is written at the high school level. In that lesson, students plan their own cleanup with an experimental design to answer a specific question. Middle school students could carry out a simpler modified version of A Scientific Cleanup.

### RESOURCES

*For the teacher...*

- Adopt a Beach Cleanup. *Save Our Seas*.
- Chesapeake Bay Foundation *Clean the Bay Day* every spring. [www.savethebaycbf.org/clean](http://www.savethebaycbf.org/clean)
- *Chesapeake Bay Program*. Chesapeake Bay Program Office, 410 Severn Avenue, Suite 109, Annapolis, MD 21403. 800-YOURBAY or [www.chesapeakebay.net](http://www.chesapeakebay.net)

The Chesapeake Bay Program represents one of the nation's largest conservation efforts, created in 1983 through an agreement between the US Environmental Protection Agency, Maryland, Virginia, Pennsylvania, the District of Columbia, and the Chesapeake Bay Commission.

- Coastal Cleanup — A Field Trip. *Waterways: Links to the Sea*.
- James River Advisory Council "James River Regional Cleanup" every spring in Charles City, Chesterfield, Cumberland, Goochland, Henrico, and Powhatan Counties, and Lynchburg and Richmond. 804-717-6688 or [www.jamesriveradvisorycouncil.com](http://www.jamesriveradvisorycouncil.com)

## HOW CAN WE HELP PROTECT OUR WATER RESOURCES?

- Marine Debris. Virginia Institute of Marine Science. [www.vims.edu/cbnerr/teach/debris/index.html](http://www.vims.edu/cbnerr/teach/debris/index.html)
- Marine Debris on the Chesapeake Bay. *Bay Link Lesson Plans*.
- The Beach Sweep. *Plastic Debris Teaching Activities*.
- *The Ocean Conservancy*. Pollution Prevention and Monitoring Office, 1432 N. Great Neck Road, Suite 103, Virginia Beach, VA 23454. 757-496-0920 or [www.oceanconservancy.org](http://www.oceanconservancy.org)  
The Ocean Conservancy coordinates the International Coastal Cleanup throughout the world. In Virginia, the International Coastal Cleanup is coordinated by Clean Virginia Waterways ([www.longwood.edu/cleanva](http://www.longwood.edu/cleanva)). Data collected during the International Coastal Cleanup is used to educate people and create solutions to the problems of solid waste and litter. The aim is to help change behaviors and practices that create debris.
- *U.S. Environmental Protection Agency*. Marine Debris Abatement - Trash in our Oceans. [www.epa.gov/OWOW/oceans/debris](http://www.epa.gov/OWOW/oceans/debris)
- *U.S. Environmental Protection Agency*. Marine Debris Curriculum: Turning the Tide on Trash. [www.epa.gov/OWOW/OCPD/Marine/contents.html](http://www.epa.gov/OWOW/OCPD/Marine/contents.html)
- Virginia Department of Environmental Quality Office of Litter Prevention and Recycling. [www.deq.state.va.us/recycle](http://www.deq.state.va.us/recycle)

Available publications include the following. "The New Three Rs: Reduce, Reuse, & Recycle!" "An Idea Notebook for Elementary Teachers on Litter Control;" and "Operation Waste Watch Kit."

*For the student...*

- *Marine Debris Coloring Book*. National Oceanic and Atmospheric Administration (NOAA). [www.education.noaa.gov/books/debris/debris1.htm](http://www.education.noaa.gov/books/debris/debris1.htm)
- *Prince William*. Rand, G. (1994). Henry Holt & Company. (Caring for a baby seal caught in an oil spill.)

## STUDENT HANDOUTS

*Cleanup Checklist for Students*

*Cleanup Data Card*

# Cleanup Checklist for Students

(IDEAS FROM “APPENDIX E: STUDENTS’ CHECKLIST” FROM  
SAVE OUR SEAS.)

## A FEW THINGS TO REMEMBER

- Make sure you wear proper clothes for the cleanup. It is always colder along the water so bring additional warm clothes with you.
- Even summer can be cool at the beach, so be prepared.
- Dressing in layers can keep you warm even in cool weather, for example, long pants, turtleneck, sweater, jacket, windbreaker, and hat.
- In case of rain, wear wool or waterproof clothes. They will keep you warm even when wet.
- Wear gloves and sturdy shoes for the cleanup. Glass or other debris can be sharp and dangerous.
- On hot or sunny days, you should have at least a quart of water, juice, or soft drinks. Drinking fluids throughout the day can keep you from getting overtired or having a headache.
- Be sure to use sunscreen.

## CLOTHES TO WEAR

- Windbreaker or jacket
- Sweater
- Long pants
- Sturdy shoes
- Gloves, for example gardening gloves, dish gloves, or disposable gloves

- Hat, either sun hat or wool hat depending on the weather

## OTHER ITEMS TO BRING

- Drinks (1 quart)
- Bag lunch
- Sunscreen
- Sunglasses
- Change of clothes in case of getting wet

## SAFETY DURING THE CLEANUP

- Stay with your group members at all times.
- Do not go near or into the water.
- Keep your shoes on at all times to protect your feet from harm.
- Keep out of dunes and do not step on any plants.
- Do not touch any wildlife that you find or taste any water or plants.
- Learn what poison ivy and poison oak look like, and avoid these plants.
- Call an adult immediately if you find any stranded animal.
- Call an adult immediately if you find any dangerous item, such as a syringe, large drum, chemical container, or medical waste.
- Do not eat any food without first carefully washing your hands.

# Cleanup Data Card

(Ideas from "International Coastal Cleanup Data Card"  
from The Ocean Conservancy.)

Cleanup Site Name: \_\_\_\_\_

Cleanup Site Location: \_\_\_\_\_

\_\_\_\_\_

Today's Date: \_\_\_\_\_

Name of Cleanup Leader (Teacher): \_\_\_\_\_

Names of People Working on This Card: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Distance Cleaned: \_\_\_\_\_

Number of Trash Bags Filled: \_\_\_\_\_

Estimated Weight of Debris Collected: \_\_\_\_\_

Stranded or Entangled Animals: \_\_\_\_\_

List all stranded or entangled animals that you found during the cleanup. Were they dead or alive?  
What were they entangled in (fishing line, rope, net, etc.)?

Most Peculiar Item Collected : \_\_\_\_\_

# Items Collected

Please pick up all debris you find on the beach or shoreline. Keep a tally of the items listed below. Tally the items as you collect them, and write the final total for each item at the end.

## SHORELINE AND RECREATIONAL ACTIVITIES

(Debris from beachgoers and picnickers, or litter from streets/storm drains, etc.)

- Bags\_\_\_\_\_
- Balloons\_\_\_\_\_
- Beverage Bottles (Plastic, 2-Liter or Less)  
\_\_\_\_\_
- Beverage Bottles (Glass)\_\_\_\_\_
- Beverage Cans\_\_\_\_\_
- Caps or Lids\_\_\_\_\_
- Clothing or Shoes\_\_\_\_\_
- Cups, Plates, Forks, Knives, Spoons\_\_\_\_\_  
\_\_\_\_\_
- Food Wrappers or Containers\_\_\_\_\_
- Pull Tabs\_\_\_\_\_
- Six-Pack Holders\_\_\_\_\_
- Straws or Stirrers\_\_\_\_\_
- Toys\_\_\_\_\_

## OCEAN/WATERWAY ACTIVITIES

(Debris from recreational/commercial fishing and boating.)

- Bait Containers or Packaging\_\_\_\_\_
- Bleach or Cleaner Bottles\_\_\_\_\_
- Buoys or Floats\_\_\_\_\_
- Crab/Lobster/Fish Traps\_\_\_\_\_
- Crates\_\_\_\_\_
- Fishing Line\_\_\_\_\_
- Fishing Lures or Light Sticks\_\_\_\_\_
- Fishing Nets\_\_\_\_\_
- Light Bulbs or Tubes\_\_\_\_\_
- Oil or Lube Bottles\_\_\_\_\_
- Plastic Sheeting or Tarps\_\_\_\_\_
- Rope\_\_\_\_\_
- Strapping Bands\_\_\_\_\_
- Wooden Pallets\_\_\_\_\_

## SMOKING-RELATED ACTIVITIES

- Cigarettes/Cigarette Filters\_\_\_\_\_
- Cigarette Lighters\_\_\_\_\_
- Cigar Tips\_\_\_\_\_
- Tobacco Packaging\_\_\_\_\_

## DUMPING ACTIVITIES

- Appliances (Refrigerators, Washers, etc.)  
\_\_\_\_\_
- Batteries\_\_\_\_\_
- Building Materials\_\_\_\_\_
- Cars or Car Parts\_\_\_\_\_
- 55-Gallon Drums\_\_\_\_\_
- Tires\_\_\_\_\_

## OTHER DEBRIS ITEMS OF CONCERN

Identify and count other items found that are of concern.

- \_\_\_\_\_
- \_\_\_\_\_